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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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03/31/2004

Masanori Kadotani

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT

PAPER NUMBER

1763

NOTIFICATION DATE

DELIVERY MODE

07/13/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/812,974

Applicant(s)

KADOTANI ET AL.

Examiner

Maureen G. Arancibia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2007.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 39-50 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 39-50 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 15 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 43 and 49 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Specifically, the text of Claim 43 has now been added to Claim 42, from which Claim 43 depends, and thus Claim 43 fails to further limit Claim 42. Likewise, the text of Claim 48 has now been added to Claim 49, from which Claim 48 depends, and thus Claim 49 fails to further limit Claim 48.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 39-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda (JP 9-17770-A) in view of U.S. Patent 6,921,724 to Kamp et al. The following rejection refers to the Machine-Assisted Translation (MAT; obtained from The Thomson Corporation; 2005) and Figures of Fukuda.**

In regards to Claims 39 and 45, Fukuda teaches a plasma processing method for conducting a plurality of different processing on a film on a front side of a specimen W

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placed on a mount surface of a specimen table 21 disposed inside a processing chamber (Figure 3) using plasma generated therein, comprising:

adjusting an internal temperature of the specimen table formed of a heat conduction member so that a temperature in a central portion of the specimen table becomes higher than a temperature in an outer circumferential portion of the specimen table by a predetermined value (Paragraphs 19, 29);

generating a plasma by supplying a processing gas to the interior of the processing chamber and processing the film by applying a bias electric power 19 to the specimen table (Paragraph 29);

while, after the specimen is placed on the specimen table, supplying a heat conducting gas with a lower pressure to a space between the mount surface positioned above the central portion of the interior of the specimen table and a rear side of the specimen, and supplying a heat conducting gas with a higher pressure to a space between the mount surface positioned above the outer circumferential portion of the interior of the specimen table and a rear side of the specimen to adjust the heat conducting gas to a predetermined pressure difference in spaces of the central and outer circumferential portions of the rear side of the specimen (Paragraphs 19, 39);

and processing the film while adjusting said pressure difference to a value different from the predetermined pressure difference. (Paragraphs 34-38)

While Fukuda discloses the dual coolant system and its use and the dual heat conducting gas system and its use as different embodiments, **Fukuda also expressly teaches that the embodiments are used together.** (Paragraph 16; *In this case, the*

*supply system of a refrigerant and/or a warming medium **may be plural**. However, it is good **even when it is single**.*) Moreover, one of ordinary skill in the art would have been further motivated to combine the teachings of Fukuda to combine the fine control over the surface temperature of the wafer provided by each embodiment (Paragraphs 32, 38) to obtain even better control over the surface temperature of the wafer, thereby obtaining a precise and repeatable etching process (Paragraph 41). In other words, one of ordinary skill in the art would expect that since each embodiment of Fukuda attempts such temperature control, using the two embodiments together would produce even better control. Lower temperature and higher heat conductance at the periphery could, for example, work together to accomplish the same goal of offsetting the excess radiant heating at the periphery. (Paragraphs 29 and 38)

Fukuda teaches that an upper surface of the specimen table can be a dielectric film (*ceramic*), as broadly recited in the claim. (Paragraph 36)

Fukuda teaches that a ring-like protrusion that divides the two areas from each other is disposed on the upper surface of the table, the upper surface of the table contacting the rear surface of the specimen, as broadly recited in the claims. (Figure 3b; Paragraph 36)

Fukuda also teaches that a ring-like part is disposed between the central channel and the outer circumferential channel inside the heat conductive block (i.e. there is a ring-shaped portion of the heat conductive block separating the central and outer channels). This ring-like part may be considered to suppress a heat conduction between the central portion and the outer circumferential portion of the heat conductive

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block, as broadly recited in the claims, *relative to the amount of heat conduction that would take place between the central portion and the outer circumferential portion if the ring-like part were absent; i.e. there was a single channel inside the heat conductive block.*

Fukuda also teaches that the temperature of the specimen table is adjusted by adjusting the temperature of coolants passing through passages 14, 11 disposed at a central portion and an outer circumferential portion of the specimen table. (Paragraphs 26-29)

In regards to Claims 39-50, Fukuda does not expressly teach processing upper and lower films of a plurality of films on a specimen with different temperature profiles obtained with the process settings as recited in the claims, or that the temperature settings can be adjusted on the basis of information obtained before processing of the specimen.

Kamp et al. teaches processing upper and lower films of a plurality of films on a specimen with different temperature profiles across the specimen, and adjusting the temperature settings based on information obtained before processing of the specimen about the type of material of each film layer. (Figure 4C; Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Fukuda to process upper and lower films of a plurality of films on a specimen with different temperature profiles across the specimen, and to adjust the temperature settings based on information obtained before processing of the specimen about the

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type of material of each film layer. The motivation for doing so, as taught by Kamp et al., would have been to process multi-layered specimens with changing temperatures layer by layer so as to achieve profiles and selectivity that cannot be otherwise achieved (Column 11, Lines 28-30), without having to dedicate chambers for each temperature, increasing manufacturing flexibility and cost effectiveness (Column 11, Lines 30-39). Moreover, by changing the temperatures of the central and circumferential portions of the specimen, the wafer center to wafer edge depth and/or profile uniformity can be improved. (Column 9, Lines 30-49)

It further would have been obvious to one of ordinary skill in the art, in practicing the method taught by the combination of Fukuda and Kamp et al., through routine experimentation, to optimize the values of the pressures of the heat conductive gases and the temperatures of the cooling mediums in the manner recited in the claims (i.e. changing the pressures while holding the temperatures of the cooling mediums constant, or if necessitated by the temperature profile desired on the specimen, changing the temperatures of the cooling mediums so as to attain a greater temperature gradient across the specimen), as result-effective variables to optimize the edge depth and/or etch profile uniformity *for the type of film layer being processed*. See Kamp et al., Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39.

Response to Arguments

4. Applicant's arguments filed 1 May 2007 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that the claimed method has various asserted benefits over applicant's disclosed background art, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the ring-like protrusion prevents all heat exchange between the gases in the separate central and outer circumferential spaces) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Examiner maintains that Fukuda teaches that a ring-like protrusion that divides the two areas from each other is disposed on the upper surface of the table (*making a barrier suitable among both blocks interpose in this case*; Paragraph 36), the upper surface of the table contacting the rear surface of the specimen, as broadly recited in the claims. (Figure 3b; Paragraph 36)

It is believed that all of applicant's arguments have been addressed here or in the rejection set forth above, which clearly presents examiner's position in regards to the teachings of the cited prior art.

Conclusion

5. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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